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IS 4552-2 (1993): Automotive vehicles - Portable jacks for automobiles, Part 2 Hydraulic jacks [TED 6: Automotive Body, Chassis, Accessories and Garage Equipments]

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Bhartṛhari—Nītiśatakam

“Knowledge is such a treasure which cannot be stolen”





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भारतीय मानक

स्वचल वाहन — स्वचालित वाहनों के लिए सुवाह्य जैक

भाग 2 द्रवचालित जैक — विशिष्ट

( पहला पुनरीक्षण )

*Indian Standard*

AUTOMOTIVE VEHICLES —  
PORTABLE JACKS FOR AUTOMOBILES

PART 2 HYDRAULIC JACKS — SPECIFICATION

( *First Revision* )

UDC 621.866-82 : 629-113

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BUREAU OF INDIAN STANDARDS  
MANAK BHAVAN, 9 BAHADUR SHAH ZAFAR MARG  
NEW DELHI 110002

## FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards, after the draft finalized by the Automotive Accessories and Garage Equipment Sectional Committee had been approved by the Transport Engineering Division Council.

This standard covering both hydraulic and mechanical type of jacks was published in 1968. In the past 24 years, due to developments of various types of vehicles, different types and capacities of jacks are now being manufactured and used. In order to cater all types of such jacks, this revision has been prepared. In view of separate requirement of mechanical and hydraulic type these are now being covered in separate parts. Part 1 covers the mechanical jacks and Part 2 covers the hydraulic jacks.

For the purpose of deciding whether a particular requirement of this standard is complied with, the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off, in accordance with IS 2 : 1960 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

The Committee responsible for the preparation of this standard is given at Annex A.

*Indian Standard*

# AUTOMOTIVE VEHICLES — PORTABLE JACKS FOR AUTOMOBILES

## PART 2 HYDRAULIC JACKS — SPECIFICATION

### (First Revision)

#### 1 SCOPE

**1.1** This Indian Standard ( Part 2 ) covers types, constructional and operational features and methods of tests for hydraulically operated lifting jacks with integral pumping mechanism commonly used for passenger cars, commercial vehicles, heavy duty vehicles and trailer and capable of being applied from below the vehicle and trailer or from its sides or end ( bumper ).

**1.2** This standard also includes hydraulically operated trolley lifting jacks, generally used in garages and are manually manoeuvred from place to place inside the garage.

#### 2 TYPES

**2.1** The jacks covered in this standard shall be of the following types:

- a) Hydraulic jacks with integral pump for light and medium vehicles:
  - 1) Portable hydraulic jacks with single lift for light vehicles ( Plain ram 1B1 see Table 1, Screwed ram 1B2 see Table 2 ).
  - 2) Portable hydraulic jacks with single lift for light and medium vehicles ( Plain ram 2A1 see Table 4, Screwed 2A2 ram see Table 5 ).
  - 3) Portable hydraulic jacks with multiple ( telescopic ) lifts for light and medium vehicles 1C ( see Table 3 ).
- b) Hydraulic jacks with integral pump for heavy vehicles and trailers:
  - 1) Hydraulic jacks with single lift for heavy vehicles ( Plain ram 2B1 see Table 6, Screwed ram 2B2 see Table 7 ).
  - 2) Hydraulic jacks with single as well as multiple ( telescopic ) lifts for trailer 2B3 ( see Table 8 ).
- c) Hydraulic trolley jacks for light and medium vehicles:
  - 1) Hydraulic trolley jacks for light vehicles 3A ( see Table 9 ).
  - 2) Hydraulic trolley jacks for medium vehicles 3B ( see Table 10 ).

**2.1.1** Hydraulic jacks with single lift shall be either plain ram with an extension screw or screwed ram with safety lock nut.

**2.1.2** Hydraulic trolley jacks for medium vehicles may be provided with an extra long reach ( ELR ) to suit rear extended vehicle body.

#### 3 DIMENSIONS AND OPERATING EFFORT

##### 3.1 Dimensions

The functional dimensions of the jacks listed under **2.1** shall be as given in Tables 1 to 10.

#### 4 DESIGNATION

**4.1** The jacks shall be designated by:

- a) Type,
- b) Nominal lifting capacity in tonnes, and
- c) Hydraulic lift in millimetres.

*Example*

Integral hydraulic jacks of plain ram with an extension screw type having a lifting capacity of 5 tonnes and hydraulic lift of 150 mm shall be designated as:

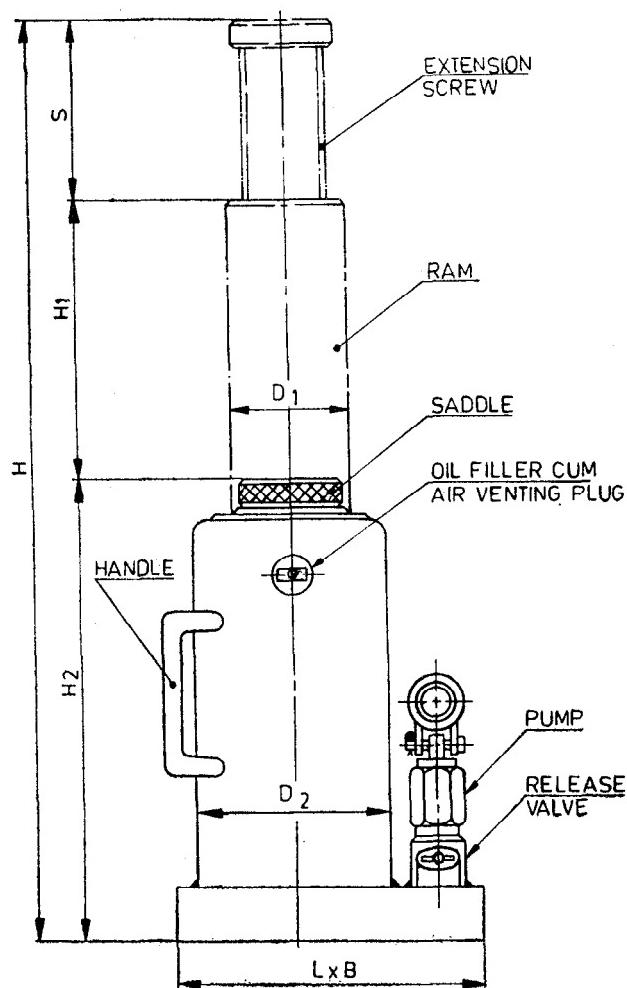
H 1B1 5 — 150 IS

#### 5 MATERIAL AND CONSTRUCTIONAL FEATURES

**5.1** Strength and other essential physical properties of the component parts of the jack shall be adequate for the purpose intended. All castings, which shall be in accordance with the appropriate Indian Standard, shall be of uniform quality, free of blow holes, porosity, hard spots, shrinkage, cracks or other deleterious defects which might adversely affect the intended use. Processes such as peening or plugging shall not be used on castings or forgings for reclaiming any part of the jack. Lubricants, hydraulic fluids and paints shall be compatible with seal materials, where seals are used.

**Table 1 Single Lift Hydraulic Jacks 1B1 with Integral Pumps ( Plain Ram )  
Capacity 2t to 12t**  
( Clauses 2.1 and 3.1 )

All dimensions in millimetres.



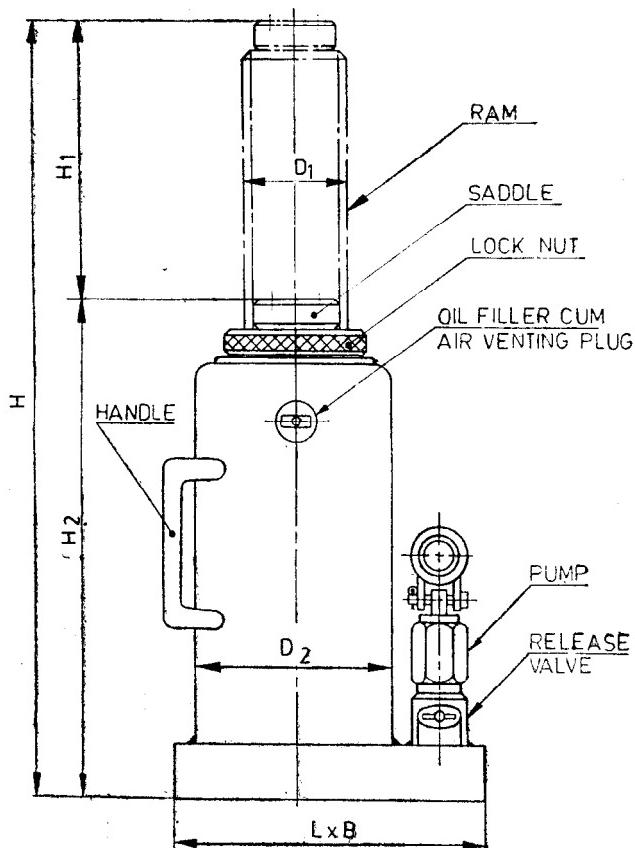
Sl No.	Capa- city in Tonnes	Ram Dia	Body Dia	Total Exten- ded Height <i>H</i>	Hydrau- lic Lift	Closed Height <i>H</i> <sub>1</sub>	Base Size <i>L</i> × <i>B</i>	Screw Exten- sion <i>S</i>
		<i>D</i> <sub>1</sub>	<i>D</i> <sub>2</sub>	<i>H</i>	<i>H</i> <sub>2</sub>	<i>H</i> <sub>1</sub>		
1	2	30	65	385	120	190	115 × 115	75
2	4	30	65	450	150	220	115 × 115	80
3	5	36	72	481	150	231	125 × 125	100
4	8	43	86	486	150	236	150 × 140	100
5	10	46	98	486	150	236	150 × 150	100
6	12	52	98	486	150	236	150 × 150	100

#### NOTES

- 1 For extra desired lift, the closed height shall be increased by extra desired lift.
- 2 For desired reduction in closed height the lift shall be reduced by the same reduction in closed height.

**Table 2 Single Lift Hydraulic Jacks with Integral Pumps (Screwed Ram) Type 1B2**  
**Capacity 2t to 12t**  
*(Clauses 2.1 and 3.1)*

All dimensions in millimetres.



Sl No.	Capacity in Tonnes	Ram Dia	Body Dia	Total Extended Height H	Hydraulic Lift	Closed Height H2	Base Size
		D <sub>1</sub>	D <sub>2</sub>		H <sub>1</sub>	H <sub>2</sub>	L × B
1	2	30	65	325	120	205	115 × 115
2	3	30	65	385	150	235	115 × 115
3	5	36	72	398	150	248	125 × 125
4	8	43	86	398	150	248	150 × 140
5	10	46	90	402	150	252	150 × 150
6	12	52	98	402	150	252	150 × 150

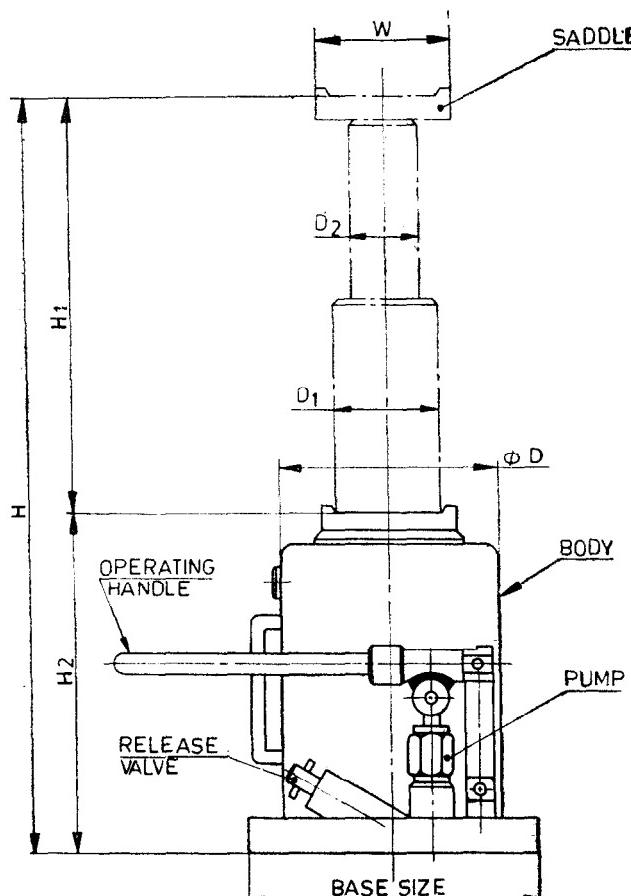
#### NOTES

- For extra desired lift, the closed height shall be increased by extra desired lift.
- For desired reduction in closed height the lift shall be reduced by the same reduction in closed height.

**Table 3 Multiple Telescopic Lift Hydraulic Jacks with Integral Pump Type 1C**

( Clauses 2.1 and 3.1 )

All dimensions in millimetres.



Sl. No.	Capacity in Tonnes	Body Dia	Ram Dia	Ram Dia	Total Exten- ded Height <i>H</i>	Hydraulic Life	Closed Height <i>H</i> <sub>1</sub>	Base Size <i>L</i> × <i>B</i>	Saddle Width <i>W</i>
		<i>D</i>	<i>D</i> <sub>1</sub>	<i>D</i> <sub>2</sub>			<i>H</i> <sub>2</sub>		
1	2	95	43	30	445	250	195	150 × 150	65
2	4	126	52	36	445	250	195	175 × 150	80
3	6	126	52	36	500	270	230	175 × 150	100
4	8	128	60	42	370	200	170	175 × 165	100
5	8	128	60	42	500	260	240	175 × 165	100
6	10	146	67	45	370	200	170	200 × 150	100
7	10	146	67	45	500	260	240	200 × 150	100
8	12	150	73	50	530	280	250	200 × 160	120

**NOTES**

- 1 For extra desired lift, the height shall be increased by  $\frac{\text{extra desired lift}}{\text{No. of stages}}$ .

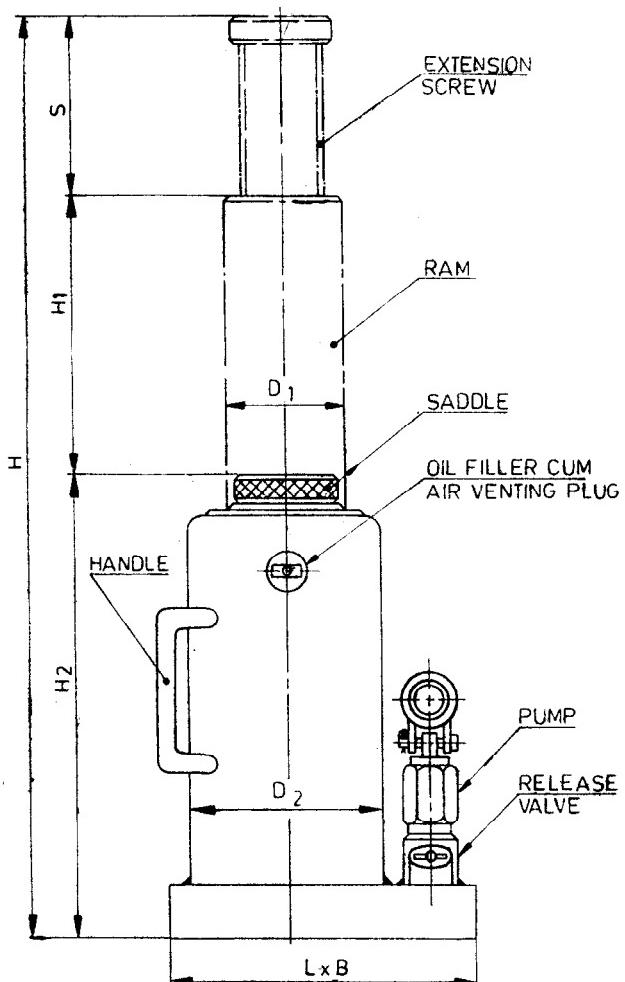
*Example* — In case of double stage telescopic jack for an extra lift of 100 mm, the closed height shall be increased by  $\frac{100}{2}$  i. e. 50 mm.

- 2 For desired reduction in closed height, the lift shall be reduced by desired reduction in closed height × No. of stages.

*Example* — For 25 mm reduction in closed height in case of double stage telescopic jack, the lift shall be reduced by  $25 \times 2$ , i. e. 50 mm.

**Table 4 Single Lift Hydraulic Jacks with Integral Pumps ( Plain Ram ) Type 2A1**  
**Capacity 15t to 35t**  
*( Clauses 2.1 and 3.1 )*

All dimensions in millimetres.



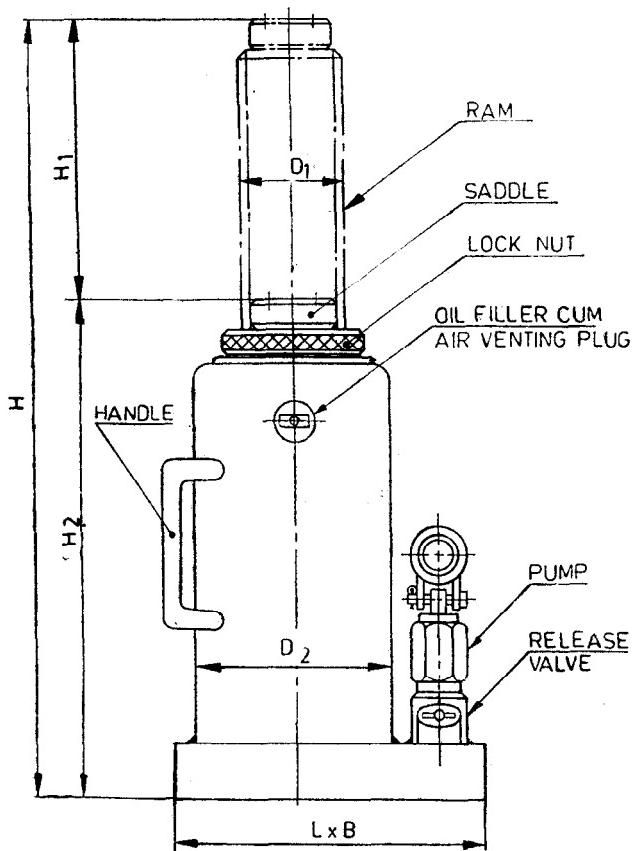
Sl No.	Capacity in Tonnes	Base Dia	Body Dia	Total Extended Height H	Hydraulic Lift H1	Closed Height H2	Base Size L x B	Screw Extension S
		D <sub>1</sub>	D <sub>2</sub>					
1	15	58	112	500	150	250	170 x 170	100
2	20	65	126	500	150	250	180 x 180	100
3	25	70	138	520	150	270	190 x 190	100
4	30	76	146	520	150	270	200 x 200	100
5	35	80	161	530	150	280	215 x 200	100

#### NOTES

- 1 For extra desired lift, the closed height shall be increased by extra desired lift.
- 2 For desired reduction in closed height the lift shall be reduced by the same reduction in closed height.

**Table 5 Single Lift Hydraulic Jacks with Integral Pumps ( Screwed Ram ) Type 2 A2****Capacity 15t to 35t**( *Clauses 2.1 and 3.1* )

All dimensions in millimetres.



S1 No.	Capacity in Tonnes	Ram Dia	Body Dia	Total Exten- ded Height <b>H</b>	Hydraulic Lift	Closed Height	Base Size
1	15	$D_1$	$D_2$	410	150	260	$170 \times 170$
2	20	65	126	410	150	260	$180 \times 180$
3	25	70	138	435	150	285	$190 \times 190$
4	30	76	146	435	150	285	$200 \times 200$
5	35	80	161	450	150	300	$215 \times 200$

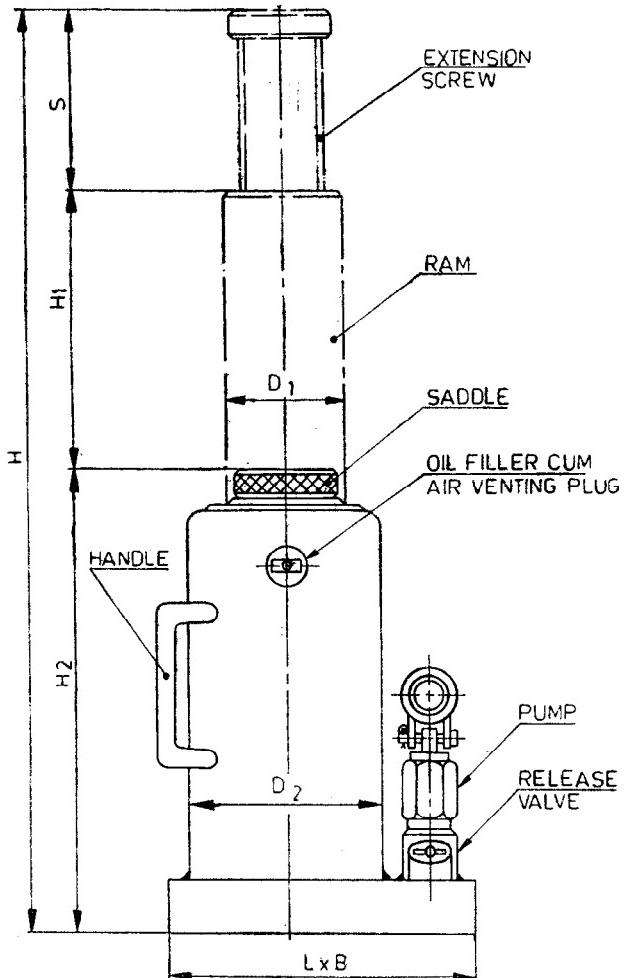
## NOTES

1 For extra desired lift, the closed height shall be increased by extra desired lift.

2 For desired reduction in closed height the lift shall be reduced by the same reduction in closed height.

**Table 6 Single Lift Hydraulic Jacks with Integral Pumps ( Plain Ram ) Type 2B1****Capacity 15t to 35t**( *Clauses 2.1 and 3.1* )

All dimensions in millimetres.



Sl No.	Capacity in Tonnes	Ram Dia	Body Dia	Total Extended Height	Hydraulic Lift	Closed Height	Base Size	Screw Extension
		D <sub>1</sub>	D <sub>2</sub>	H	H <sub>1</sub>	H <sub>2</sub>	L × B	S
1	15	58	ϕ 112	700	250	350	170 × 170	100
2	20	65	ϕ 126	700	250	350	180 × 180	100
3	25	70	ϕ 138	720	250	370	190 × 190	100
4	30	90	200 × 175	710	200	385	300 × 225	125
5	35	100	225 × 200	725	200	400	320 × 250	125

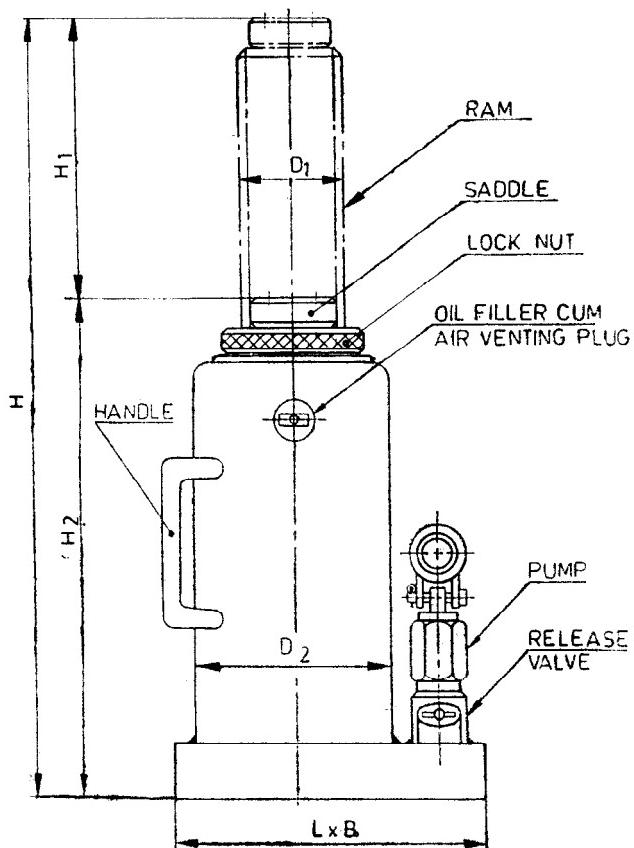
**NOTES**

1 For extra desired lift, the closed height shall be increased by extra desired lift.

2 For desired reduction in closed height the lift shall be reduced by the same reduction in closed height.

**Table 7 Single Lift Hydraulic Jacks with Integral Pumps ( Screwed Ram ) Type 2B2  
Capacity 15t to 35t**  
( Clauses 2.1 and 3.1 )

All dimensions in millimetres.



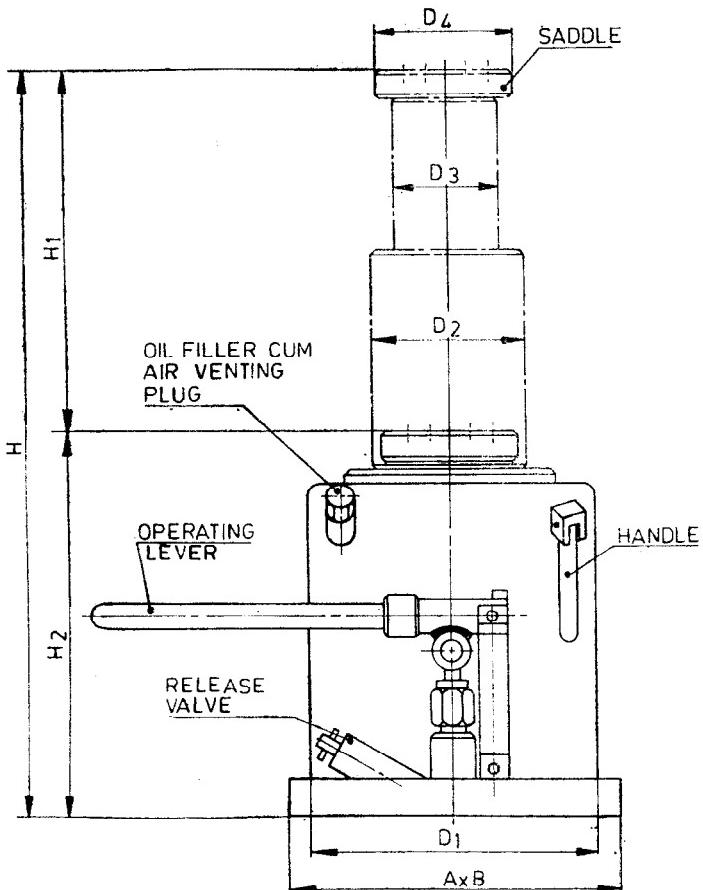
Sl No.	Capacity in Tonnes	Ram Dia	Body Size	Total Extended Height $H$	Hydraulic Lift	Closed Height $H_2$	Base Size
		$D_1$	$D_2$		$H_1$		$L \times B$
1	15	56	$\phi 112$	610	250	360	170 × 170
2	20	65	$\phi 126$	610	250	360	180 × 180
3	25	70	$\phi 138$	635	250	385	190 × 190
4	30	90	200 × 175	585	200	385	300 × 225
5	35	100	225 × 200	600	200	400	320 × 250

#### NOTES

- 1 For extra desired lift, the closed height shall be increased by extra desired lift.
- 2 For desired reduction in closed height the lift shall be reduced by the same reduction in closed height.

**Table 8 Multiple ( Telescopic ) Lift Hydraulic Jacks with Integral Pumps Type 2B2 Capacity 15t to 35t**  
*( Clauses 2.1 and 3.1 )*

All dimensions in millimetres.



Sl No.	Capa- city in Tonnes	Body Dia	Ram <sub>1</sub> Dia	Ram <sub>2</sub> Dia	Saddle Dia	Total Extended Height	Hydrau- lic Lift	Closed Height	Base Plate Size
		D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	D <sub>4</sub>	H	H <sub>1</sub>	H <sub>2</sub>	A × B
1	15	161	80	58	85	540	265	275	215 × 200
2	20	217	115	80	105	540	265	275	270 × 250
3	25	240	125	85	120	540	265	275	315 × 260
4	30	260	140	90	130	540	265	275	350 × 280
5	35	280	150	100	140	540	265	275	380 × 300

#### NOTES

- 1 For extra desired lift, the closed height shall be increased by  $\frac{\text{extra desired lift}}{\text{No. of stages}}$ .

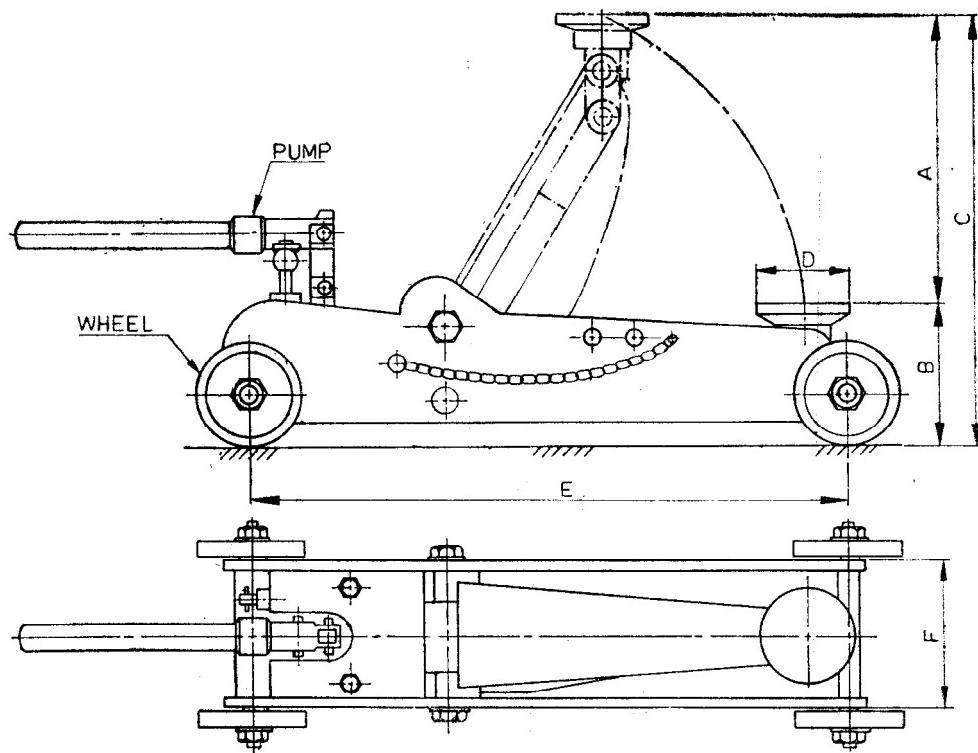
*Example* — In case of double stage telescopic jack for an extra lift of 100 mm, the closed height shall be increased by  $\frac{100}{2}$  i. e. 50 mm.

- 2 For desired reduction in closed height, the lift shall be reduced by desired reduction in closed height × No. of stages.

*Example* — For 25 mm reduction in closed height in case of double stage telescopic jacks, the lift shall be reduced by  $25 \times 2$ , i. e. 50 mm.

**Table 9 Hydraulic Trolley Jacks Capacity 1-T, 1·5 and 2-T Type 3A**( *Clauses 2.1 and 3.1* )

All dimensions in millimetres.



Sl No.	Capacity in Tonnes	Hydraulic Lift <b>A</b>	Closed Height <b>B</b>	Total Extended Height <b>C</b>	Saddle Dia		
					<b>D</b>	<b>E</b>	<b>F</b>
1	1	270	130	400	85	540	129
2	1·5	270	130	400	90	540	129
3	2	270	130	400	100	540	143

## 5.2 Operating Mechanism

The jack shall be operated by a hand lever of maximum length of 1 000 mm ( 1 150 mm in case of trolley jacks of 5 and 10 tonnes capacity ). The operating effort required shall not exceed 30 kgf for all loads.

**5.3** Single lift jacks shall be provided with a suitable handle to facilitate transportation.

**5.4** The jack shall be provided with a filling/venting plug suitably located on the jack body.

**5.5** The jack shall be provided with a release valve in inclined position at a suitable angle to the base, so that it can be easily opened and closed with the operating handle when the jack is under the vehicle.

**5.6** The jack shall be provided with a suitable saddle.

**5.7** Swiveling head saddle shall be provided, if specified.

## 6 OPERATIONAL FEATURES

**6.1** The jack shall be operated in vertical position and shall be able to lift the nominal load. When pressure is released and a force of 30 kgf is applied on the ram, the ram shall be able to be lowered to its closed height.

**6.2** The ram shall move jerk-free throughout its entire range of movement either while lifting or while retracting.

## 7 TESTS SCHEDULE FOR TESTING OF JACKS

### 7.1 Type Tests

Five jacks shall be supplied for type tests. Tests and the number of jacks to be tested for each test shall be as given below.

#### 7.1.1 Visual Test

All jacks shall be free from material as well as manufacturing defects like cracks, blow holes, etc.

#### 7.1.2 Dimensional and Material Check

All the jacks shall be subjected to detailed dimensional check and shall conform to the functional dimensions as given in Tables 1 to 10 ( as applicable ). One jack shall be checked for material, heat treatment/hardness, etc, as stipulated in the applicable drawings.

#### 7.1.2.1 Tests

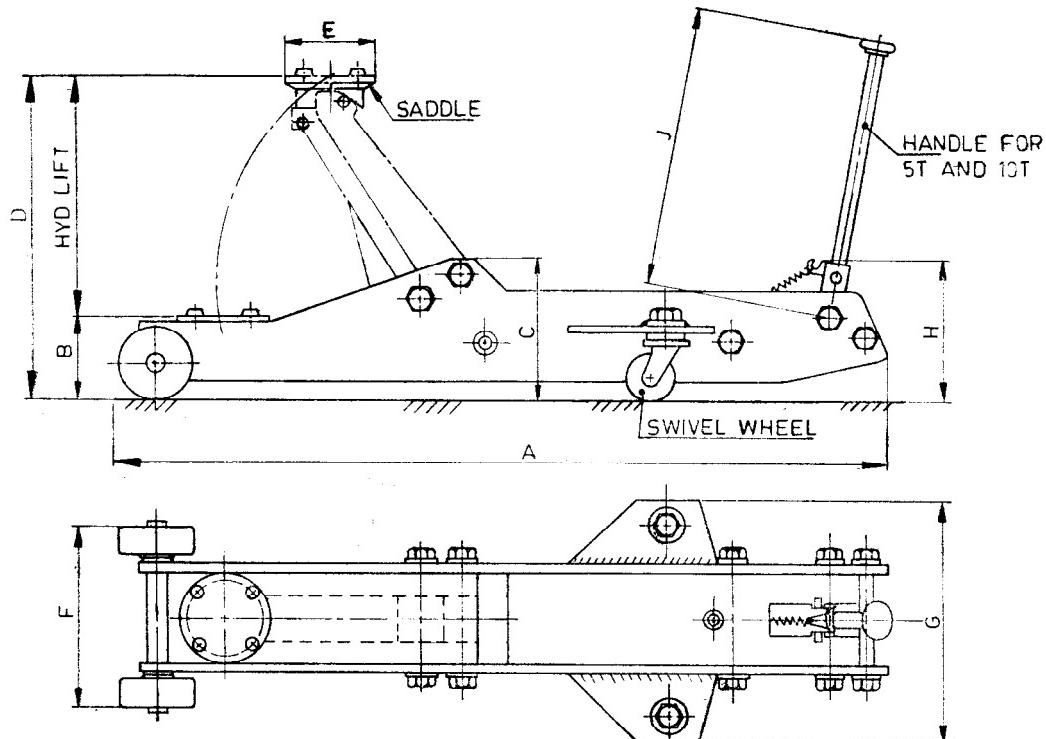
Jacks shall be subjected to the following tests in order of sequence as given in Table 11. The tests shall be carried out either on actual vehicle/trailer or on a rig simulating operating of a jack on a vehicle for ascertaining their conformity to this standard. In these cases the jacks shall be subjected to tilted loads upto  $\pm 5^\circ$  angle.

#### 7.1.3 No Load Test

The jack shall be operated without load to its maximum lift during which it shall work smoothly jerk-free and there shall be no leakage. After the jack lifts to its maximum the release valve shall be opened and the ram shall be made to retract to its closed height by applying a load of maximum 30 kgf. The jack shall not show any sign of leakage.

**Table 10 Hydraulic Trolley Jacks General Design Specification Type 3B**  
( Clauses 2.1 and 3.1 )

All dimensions in millimetres.



Sl. No.	Capacity in Tonnes	Hydraulic Lift	Dimensions								
			A	B	C	D	E	F	G	H	J
1	5	475	1 400	145	258	620	165	326	440	250	1 150
2	10	475	1 400	145	258	620	165	326	440	250	1 150

**\*7.1.4 Overload Test Before Performance**

Jacks shall be loaded with a load of 120 percent of rated capacity and operated from the minimum to maximum position and back. During this test the jack shall operate smoothly throughout the range without any slip or other visible damage. During this test safety valve, when provided, shall be adjusted to higher pressure.

**\*7.1.5 Performance Test**

Jacks shall be loaded with a load of rated capacity and operated from the minimum to the maximum position and back. After repeating the cycle 100 times with an interval of 10 minutes between each cycle, the jack shall work smoothly throughout the range without undue play or slip between the moving parts.

**\*NOTE —** The tests at 7.1.4 and 7.1.5 shall be carried out with the extension screw opened to its half to three fourth length.

**7.1.6 Safety Valve Opening Test**

The safety valve ( when provided ) shall be set in such a way that it opens between the pressure range corresponding to 110 percent to 120 percent load of its rated capacity and shall be checked at the end of all tests.

**7.1.7 Overload Test After Performance**

The test shall be repeated in accordance with 7.1.4.

**7.1.8 Load Sustaining Test**

The saddle of the jack shall be lifted to the middle of its stroke and loaded to 120 percent of the nominal lifting capacity. The load shall be sustained for one hour. After the end of one hour, the reduction in the height of saddle shall not be more than 3 mm. The load shall be removed after the end of this period and the test repeated three times. After this test, jacks shall be left for 24 hours at room temperature and shall not show any sign of distortion or leakage of oil at the end of this test. This test shall be conducted after adjusting the safety valve for higher pressure and preferably at a temperature of 27°C.

**7.1.9 Operating Torque Test**

This test shall be carried out by loading the jacks to its rated capacity and effort required at the end of 1 metre handle may be measured either by torque wrench or any other suitable method. The handle effort shall not exceed as given in 5.2.

**7.2 Acceptance Tests**

The following shall constitute acceptance tests:

- Visual ( see 7.1.1 ),

- Dimensional check ( see 7.1.2 ),
- Material check ( see 7.1.2 ),
- No load test ( see 7.1.3 ),
- Overload test before performance, ( see 7.1.4 ),
- Performance test for 25 operations only ( see 7.1.5 ),
- Safety valve opening test ( see 7.1.6 ),
- Load sustaining test for one hour ( see 7.1.8 ), and
- Operating torque test ( see 7.1.9 ).

**8 SAMPLING**

**8.1** Sampling scheme for different tests shall be followed as below:

a) Visual	100 %	Suitable sampling plan as per IS 2500 (Part 1); 1973, inspection level IV, AQL 1.5 percent to be followed
b) No load test	100 %	
c) Safety valve opening test	100 %	
d) Overload test before performance	100 %	
e) Load sustaining test for one hour		
f) Performance test for 25 operations only		
g) Operating torque test		
h) Dimensional check	At least one sample or 1 % whichever is more	
j) Material check	Representative samples of raw materials procured and used in manufacture of finished jacks to be tested to ensure that the same conform to the specifications stipulated in the applicable drawings	

**9 MARKING**

**9.1** The jack shall be provided with a name plate giving the following information:

- Indication of the source of manufacture,
- Designation of the jack,
- Rated lifting capacity in tonnes,
- Hydraulic lift in mm, and
- Year of manufacture.

**10 PAINTING AND PRESERVATION**

All exposed surfaces of the jacks shall be well protected from corrosion and the working surface parts shall be greased.

**11 PACKING**

Packing of jacks shall be done suitably to avoid damage during transit.

**ANNEX A***( Foreword )***COMMITTEE COMPOSITION**

Automotive Accessories and Garage Equipments Sectional Committee, TED 9

*Chairman*

SHRI R. N. GULATI

*Members*

SHRI ASHOK BAJAJ  
 SHRI V. M. MANEL ( *Alternate* )  
 SHRI R. C. BALAKRISHNAN  
 SHRI J. GOPALAN ( *Alternate* )  
 SHRI A. B. BHAMARE  
 SHRI S. KUMAR ( *Alternate* )  
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 SHRI A. B. PALSE ( *Alternate* )  
 SHRI K. GOPALACHARI  
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 SHRI R. K. GUPTA ( *Alternate* )  
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 SHRI V. RAJARAMAN ( *Alternate* )  
 SHRI A. K. JINDAL  
 MANAGER ( STDZ )  
 DY DM ( TECH SERVICES ) ( *Alternate* )  
 MAJ GEN P. M. MENON  
 SHRI K. V. RAMI REDDY  
 SHRI A. K. MALIK ( *Alternate* )  
 SHRI P. S. SAMBHYAL  
 SHRI B. S. CHHABRA ( *Alternate* )  
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 Bajaj Auto Ltd, Pune  
 Ashok Leyland Ltd, Madras  
 Central Institute of Road Transport, Pune  
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 Bajaj Tempo Ltd, Pune  
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 Ministry of Defence, Ordnance Factory Board, Calcutta  
 Swaraj Mazda Ltd, Chandigarh  
 Tata Engineering and Locomotive Co Ltd, Pune  
 Kerala State Road Transport Corporation, Trivandrum  
 Association of State Road Transport Undertaking, New Delhi  
 Vehicle Research and Development Establishment, Ahmednagar  
 The Automotive Research Association of India, Pune  
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